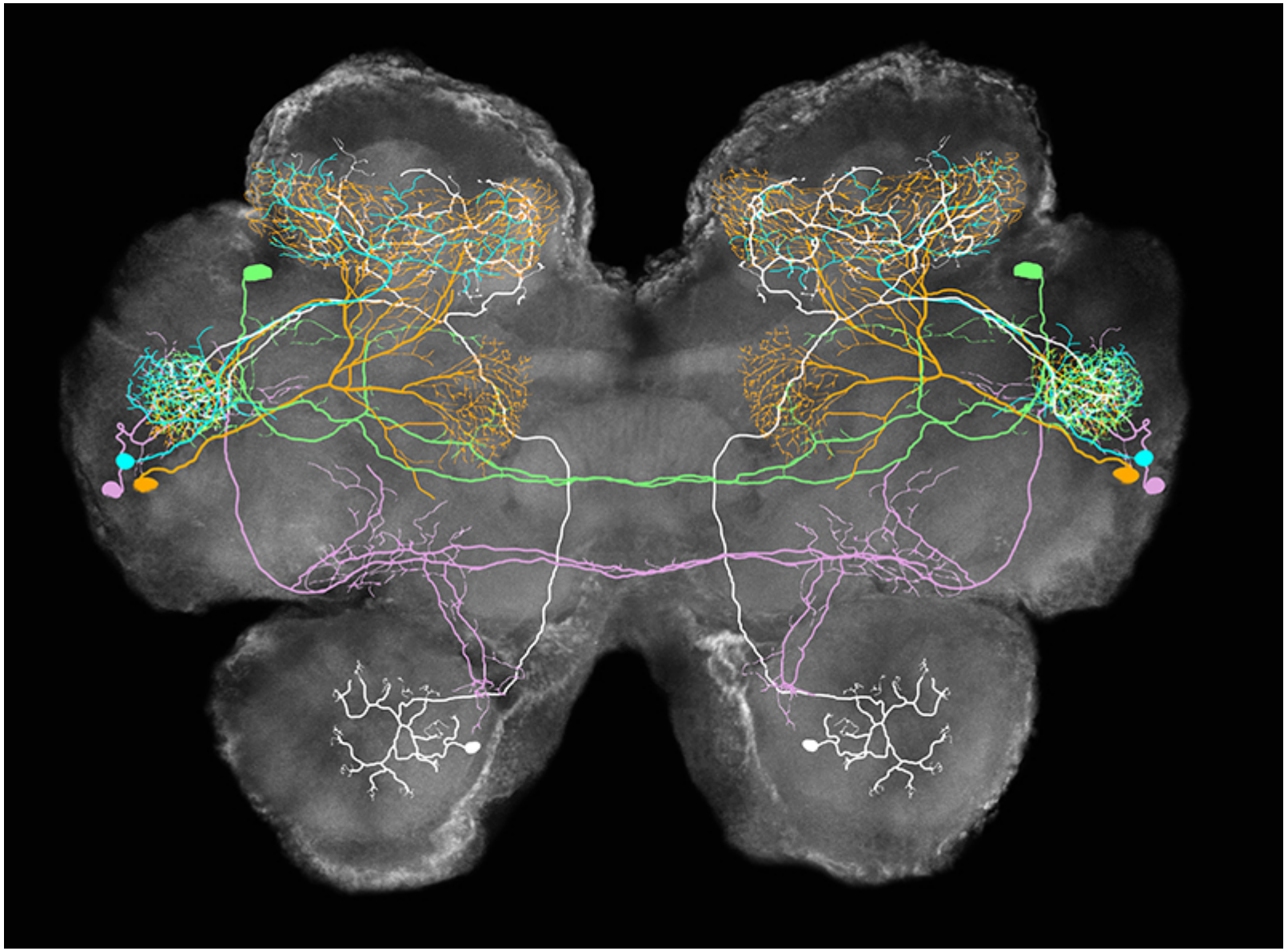
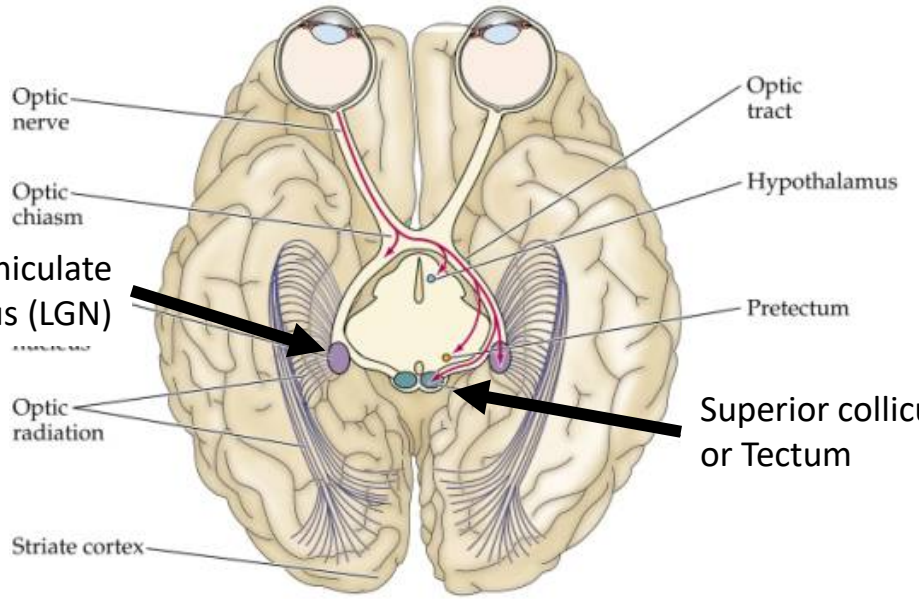
Brain Maps
Definition
and
Philosophical considerations



https://www.nichd.nih.gov/research/atNICHD/Investigators/stopfer

The visual system

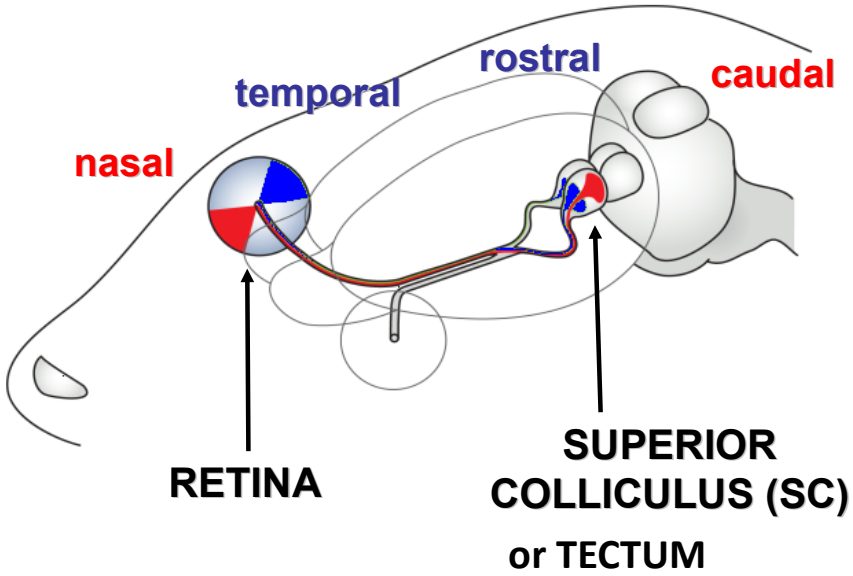
Human



Lateral geniculate nucleus (LGN)

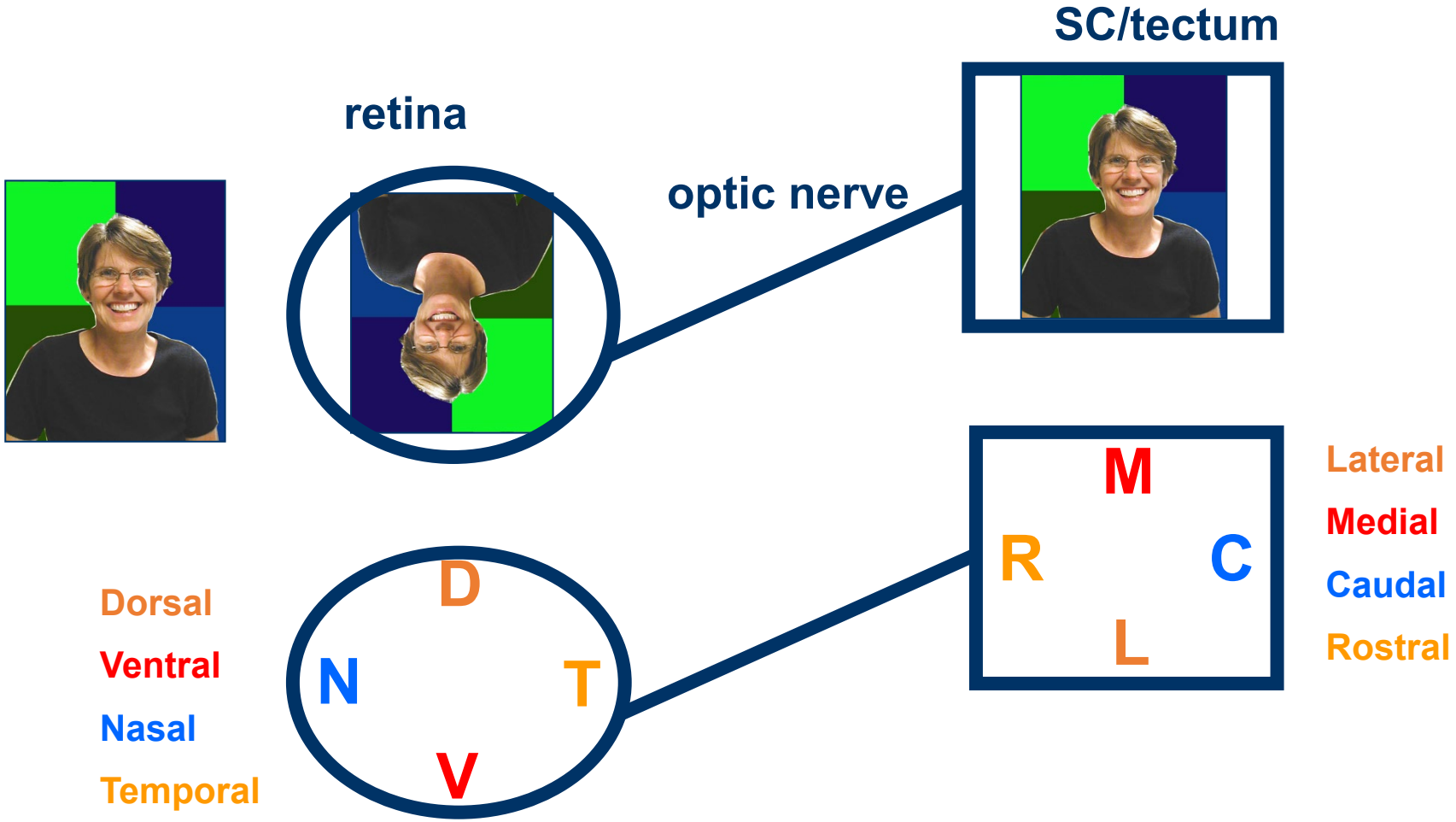
Superior colliculus (SC) or Tectum

Rodent



* Eye-specific mapping vs retinal topography

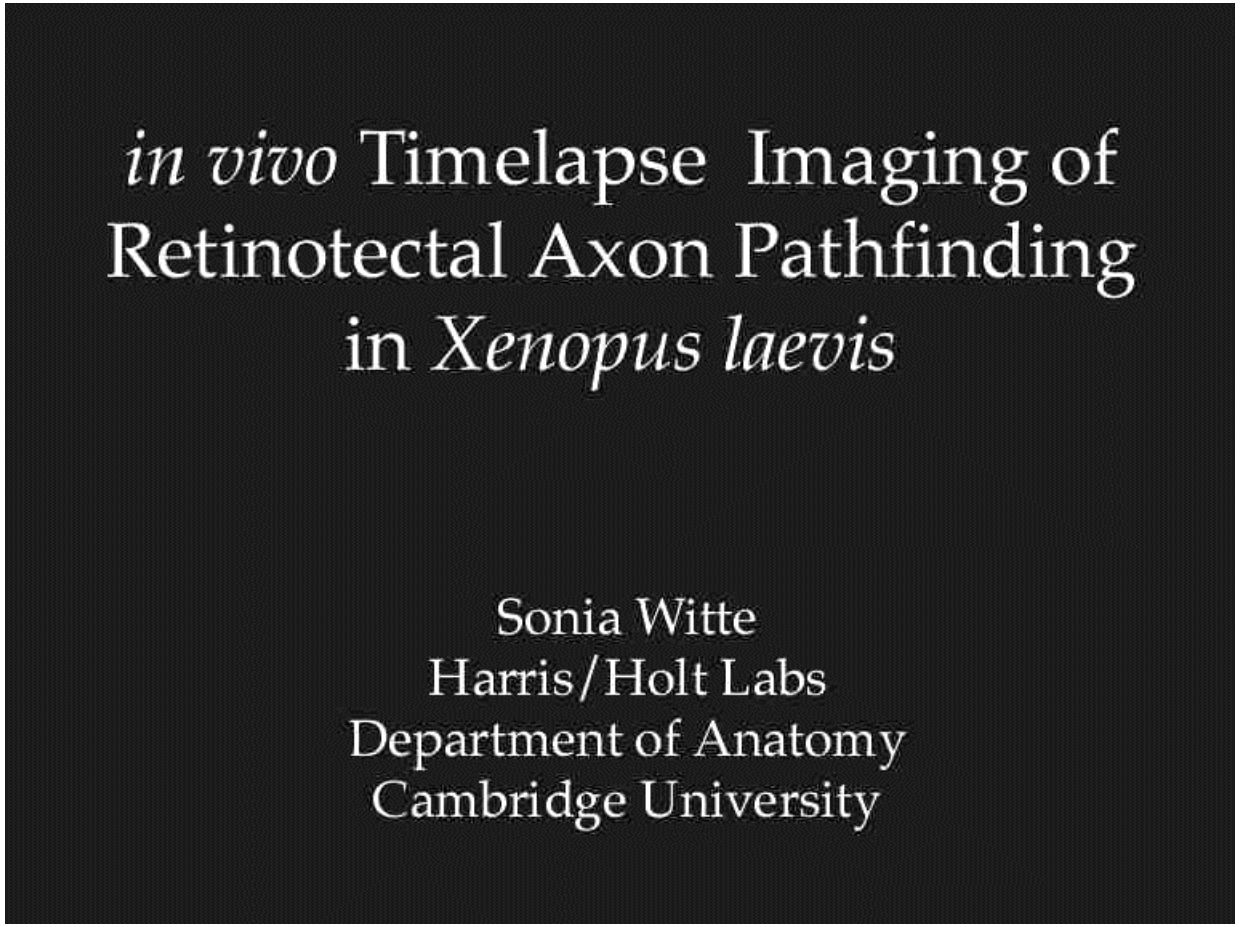
Topographic projections



How do you make a map?

It doesn’t just appear out of nowhere…

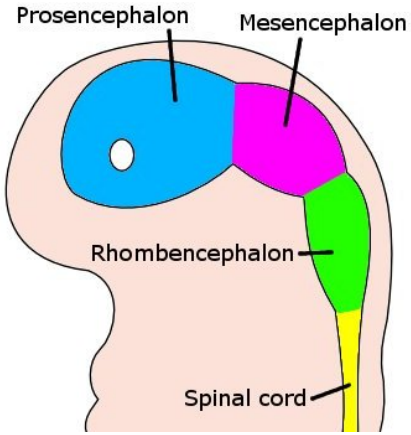
Topography is established during development



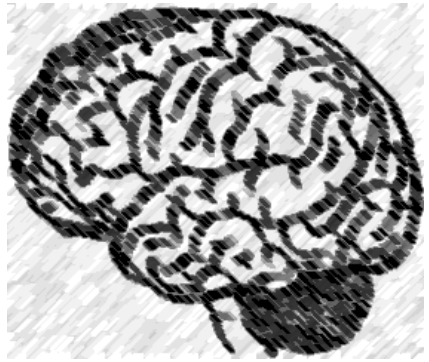
backup video

Maps generally form in two (overlapping) stages:

- **Rough map (genetically encoded guidance cues, e.g. Ephs and ephrins)**
- **Activity-dependent refinement (NMDA receptors)**

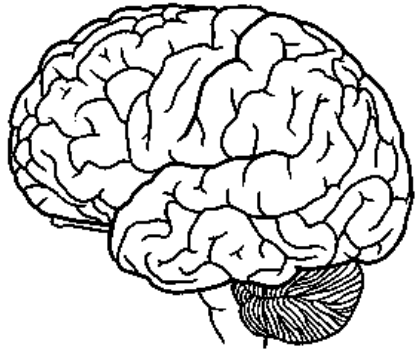


Eph and ephrin



Critical period

NMDA Receptor



Tailors the mature map to the individual's environment and experiences

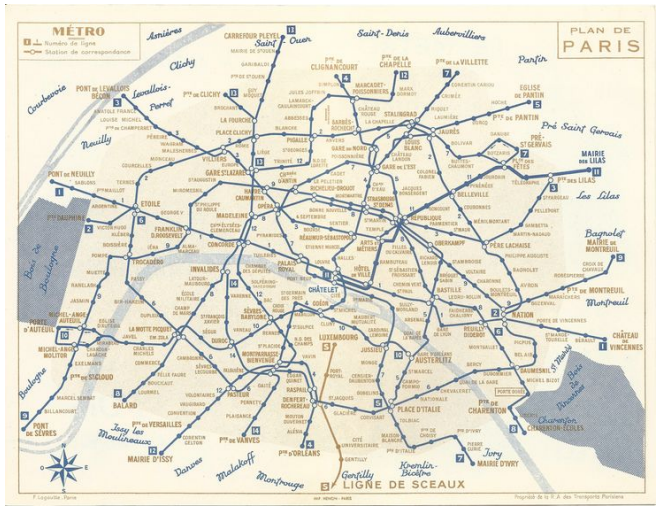
Topography: Why?

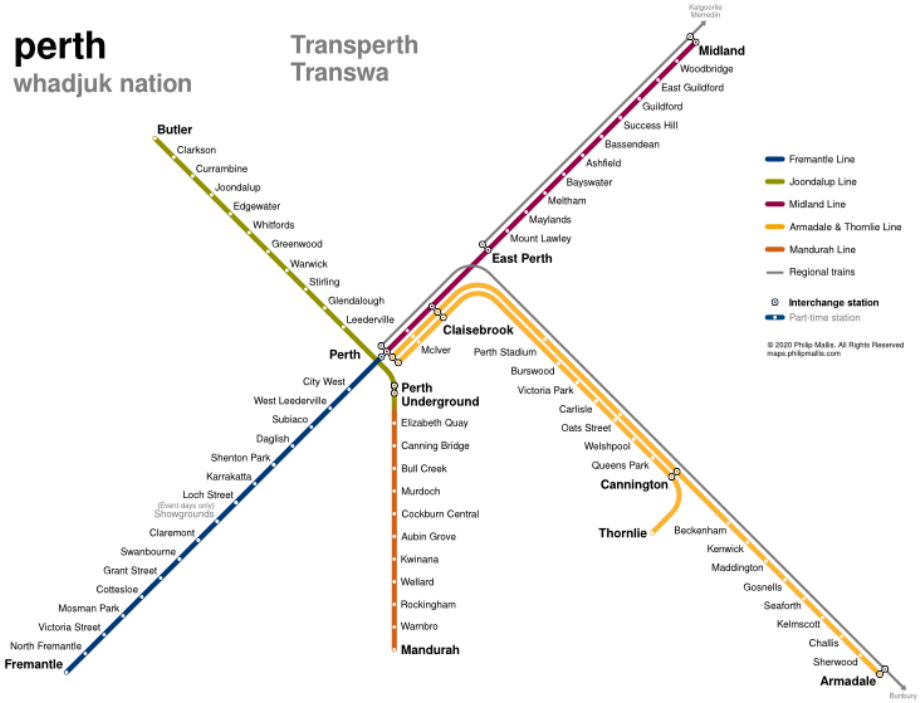
- Essential/important information
- Simplified
- Transfer of information
- Economy of resources

What do you need from a map?

London Underground

Paris metro

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East Guildford
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Success Hill
Bassendean
Ashfield
Bayswater
Meltham
Maylands
Mount Lawley
East Perth
Butler
Clarkson
Currambine
Joondalup
Edgewater
Whitfords
Greenwood
Warwick
Stirling
Glendalough
Leederville
Claisebrook
McIver
Perth Stadium
Burswood
Victoria Park
Carlisle
Oats Street
Welshpool
Queens Park
Cannington
Thornlie
Beckenham
Kenwick
Maddington
Gosnells
Seaforth
Kelmscott
Challis
Sherwood
Armadale
Perth
City West
West Leederville
Subiaco
Daglish
Shenton Park
Karrakatta
Loch Street
Showgrounds
Claremont
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Grant Street
Cottesloe
Mosman Park
Victoria Street
North Fremantle
Fremantle
Perth Underground
Elizabeth Quay
Canning Bridge
Bull Creek
Murdoch
Cockburn Central
Aubin Grove
Kwinana
Wellard
Rockingham
Warnbro
Mandurah
Fremantle Line
Joondalup Line
Midland Line
Armadale & Thornlie Line
Mandurah Line
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Train System Map
In case of train disruption see signage at station entry for train replacement bus services.
Alternatively you may be able to catch a regular bus service near this station, for more information visit transperth.wa.gov.au or download the Transperth App.

What do maps in the brain look like?

- **Representation of a continuous variable**

Point to point mapping: maintain neighbour relationships

Can reflect specialisations

- **Representation of a discontinuous variable?**

What do I need to know?

- Concept of neuronal projections
- Why maps are efficient at organising the brain

Next lectures:

- Molecular mechanisms of rough axon guidance and activity dependent refinement/plasticity (two molecules lectures)

- Examples of topographic maps in the brain
- Their development/critical period
- When things go wrong